

## CLAIMS

1. A process plant for the production of molten steel from primary and/or secondary ferrous materials in which no free oxygen is permitted to contact directly carbon-containing iron melts, comprising:-
  - (i) at least three pairs of furnaces, each furnace of a pair having a hearth base and being interconnected so as to form a continuous flowpath loop for molten metal, the first pair defining an iron making loop and the second and third pair defining primary and secondary steel refining loops respectively,
  - (ii) means for transferring molten metal from the ironmaking loop to the first refining loop and from the first refining loop to the second refining loop,
  - (iii) means for controllably supplying heat to, and removing heat from metal in the furnaces, whereby, in use a central region of metal in the furnace becomes or is maintained in its molten state and a peripheral region of the metal is maintained in a solid state such that the molten metal is contained within a stable solid shell of metal, said solid metal shell defining the walls of the furnace,
  - (iv) for each furnace, a removable lid, an enclosed space being defined between the hearth, the lid and the solid metal shell defining the walls of the furnace,
  - (v) a lifting arrangement for controllably raising out of and lowering into the melt any plant items, so that upon shut down, said items can be removed prior to solidification of the molten metal.
2. A process plant as claimed in claim 1, wherein means are provided to maintain a gas-tight seal between each hearth and the associated lid.
3. A process plant as claimed in claim 2 wherein a bath of molten metal alloy is provided around each solid metal shell, each lid being provided with a downwardly depending skirt which in use extends into said bath of molten alloy whereby to form the gas-tight seal.
4. A process plant as claimed in any preceding claim, wherein the means for controllably heating the metal includes electrical heating means arranged to conductively heat the solid metal shells and any melt contained therein.

5. A process plant as claimed in any preceding claim, wherein the means for controllably heating includes gas combustion means arranged to heat the molten metal by direct flame impingement.
6. A process plant as claimed in any preceding claim, wherein the means for controllably removing heat from the metal includes boiler tubes mounted in close proximity to the solid metal shells to facilitate radiative heat transfer.
7. A process plant as claimed in claim 6, wherein said boiler tubes form part of a steam generator.
8. A process plant as claimed in any preceding claim, wherein a purge gas inlet is provided into the enclosed spaces in close proximity to the upper surfaces of the solid metal shells, whereby, in use, purge gas is introduced as required to maintain a non-oxidising atmosphere above the solid metal shells whilst maintaining oxidising conditions as required for decarburisation and post-combustion.